

6-8

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# INTRODUCTION

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Nonpoint water pollution now comprises the largest source of water pollution. Most nonpoint sources are related to land use activities. For example, rainwater washes over farmlands and carries topsoil and residues from farm chemicals into nearby streams. Primary nonpoint sources of water pollution include runoff from agriculture, urban areas, mining, forestry, and construction activities. Pollution prevention, as it applies to nonpoint source pollution, starts with understanding how human activities affect the quality of air, land, and water and the natural interrelationships that exists between these components of the environment. Nonpoint sources contribute 65 percent of all contaminants in water bodies as compared with 9 percent from industrial sources and 17 percent from municipal sources. For years we have concentrated on reducing point sources of pollution, pollution that can be traced to a single source, only to find that our waters were not free from contamination. Nonpoint sources of pollution were often overlooked because they come from many diffuse sources and are often difficult to pinpoint and control.

This 6-8 grade activity guide has been developed to educate students about nonpoint source water pollution. Activities in the guide fall into three broad categories: (1) What is it; (2) Where does it come from; and (3) What can we do about it. Some activities may focus on one or more of these questions. For example, a single activity may focus on a specific source of nonpoint pollution and also address ways to reduce the source.

The guide contains activities on agricultural, mining, forestry, and urban sources of pollution. Activities focus on the four main types of water pollutants—sediment, nutrients, bacteria, and toxics—and best management practices to control nonpoint source pollution. Wherever possible, special emphasis is placed on acceptable pollution prevention alternatives.

All of the activities are "hands-on" and designed to blend with existing curricula in the areas of general science, math, social studies, and in some cases language arts. Each activity contains (1) objectives, (2) subject(s), (3) time, (4) materials, (5) background, (6) follow-up, (7) extension, and (8) resources. Factsheets and a glossary section included at the end of the guide contains concepts and words used in the text which may be unfamiliar.

Achieving future clean water goals will require an informed citizenry capable of understanding the complex issues surrounding water management and motivated to take action. It is our goal that wherever possible, students not only understand these issues but are given an opportunity to take action now. For this reason, we have provided suggestions on ways individuals can reduce nonpoint source pollution in their daily lives. It is the ultimate goal of this program to assure that the decisionmakers of tomorrow are equipped with a basic understanding of nonpoint pollution problems and can use this information to make knowledgeable judgments on the difficult water-related issues that we as a global society will inevitably face.

## Organization of Individual Activities

Each activity is organized in the same way, detailing objectives, materials needed, background information, and procedures. Following is a brief summary of what you should expect to find in each activity.

**OBJECTIVES:** Describes what the student should be able to do when the activity is completed.

**SUBJECT:** The general subject(s) to which the activity applies: Science, Mathematics, Social Studies, and Language Arts.

**TIME:** The approximate number of class periods (45-minute sessions) needed to complete the primary exercise(s). More time may be needed for the follow-up exercises. Some activities or follow-ups may require collecting data over several days/weeks, but will only need full class periods at the beginning and end of the activity to explain, present information, and reach conclusions.

**MATERIALS:** List of materials needed to complete the primary activity. Alternatives and optional materials are listed where appropriate. Occasionally, when simple but specialized equipment must be ordered, an address is given. This equipment can usually be reused by other classes or in other years. If the basic materials are not immediately available in your classroom, they can often be borrowed from other areas in the school or from a local college or university science department.

**BACKGROUND INFORMATION:** Background information for the specific activity. This material is suggested as a basis for teacher lecture and/or student discussion when the activity is introduced. (More general background information can be found in the factsheets located in the back of the guide.)

**ADVANCED PREPARATION:** Directions for the teacher to prepare materials in advance.

**PROCEDURE:**  
**Setting the Stage** Introduction of the activity to the students. This section uses both student discussion questions/topics and sharing of pertinent background information.

**Activity** Step-by-step description of how to do the activity. This ends with questions to demonstrate that students understand what they have done.

**Follow-Up** Conclusion of the activity by summarizing the information and drawing conclusions if applicable.

**Extension** Suggestions for extending the activity and/or suggestions for other related, non-laboratory activities.

**Resources** Reference materials either used in developing the activity or to provide additional information and addresses for kits used in the activity.

These special notations appear within some activities.

**Caution:** Special care is needed for this step/procedure.

**Note:** Further explanation about a procedure, used to clarify or reemphasize important directions.

**Optional:** Optional procedure or materials that may enhance part of the activity.

## Activity Preparation

Once you have decided on the activity(s) you will be doing, check the materials you will need, taking into account the number of students or student groups in your class(es). Many materials are readily available, but some may need to be borrowed or purchased ahead of time. Prepare copies of all the needed student

materials and/or transparencies or other materials for your use. If you plan to have the students do part or all of the Extension suggestions, you will want to add additional materials to your list or find out the information (e.g., sources of information, telephone numbers) they will need to complete the Extension. Some Extensions can be started simultaneously with the regular activity.

As you read through the activity, highlight any CAUTION or NOTE and decide whether you will do OPTIONAL suggestions. Check the suggested time for completion of the activity and add time needed to do any extension activities. The time needed may vary from class to class. These activities have all been field-tested in middle school classrooms; however, you might want to do a trial run of the activity yourself to evaluate the time needed and areas where minor problems might occur. Marking points where a break can be taken at the end of a class period is a good idea.

The factsheets included in the guide and the background material included in each activity provide the information necessary for your preparation. Further reading can be found in the lists of resources; if these are not readily available, check books on environmental concerns.

TOPICS	ACTIVITIES	FACTSHEETS
Water Pollution Sources	Name That Source Water Pollution Detectives That Settles It	Water Water Pollution Water Quality Factors Land Use and Water Quality
Point vs. Nonpoint	Name That Source Water Pollution Detectives	Water Water Pollution Water Quality Factors Land Use and Water Quality
Sediment Pollution	The Temperature's Rising	Water Pollution Land Use and Water Quality Sediment Water Pollution
Nutrient Pollution	Fertile Green	Water Pollution Land Use and Water Quality Nutrient Water Quality
Bacterial Pollution	Manure Matters Leachate Legacy	Water Pollution Land Use and Water Quality Bacterial Water Pollution
Toxic Pollution	Sock It To Me Midnight Dumpers Pesky Pesticides To Miners Go the Spoils No Place To Run To Leachate Legacy	Water Pollution Land Use and Water Quality Toxic Water Pollution
Agricultural Sources	That Settles It Fertile Green Manure Matters Pesky Pesticides Conservation Farming	Water Pollution Land Use and Water Quality Best Management Practices

TOPICS	ACTIVITIES	FACTSHEETS
Urban Sources	Fertile Green Sock It To Me Seeping Septic Tanks Pesky Pesticides No Place To Run To Leachate Legacy	Water Pollution Land Use and Water Quality Best Management Practices Individual Actions
Mining Sources	To Miners Go The Spoils	Water Pollution Land Use and Water Quality Best Management Practices
Forestry Sources	The Temperature's Rising Timber Tactics Pesky Pesticides	Water Pollution Land Use and Water Quality Best Management Practices
Industrial Sources	Midnight Dumpers Sock It To Me	Water Pollution Land Use and Water Quality Best Management Practices
Best Management Practices	Timber Tactics To Miners Go the Spoils Seeping Septic Tanks Leachate Legacy Conservation Farming	Land Use and Water Quality Best Management Practices Individual Actions